CREST Mental Maths Olympiad (CMMO)

Previous Year Paper

Class 10

Time Allowed: 1 hour   **Maximum Marks: 360**

- Additional **10 minutes** will be allotted to fill up information on the OMR Sheet, before the start of the exam.
- Fill in all the mandatory fields clearly on the OMR Sheet.
- There are a total of **100 questions** in this booklet comprising **2 sections** namely the **Basique and Avance** consisting of **80 questions (3 mark each) & 20 questions (6 marks each),** respectively.
- There's a **negative marking** of 1/3rd marks for every wrong answer. The use of a calculator is not permitted.
- There is **only ONE correct option** to a given question.
- Use **HB Pencil or Blue / Black ball point pen only** for marking the correct choice of answers on the OMR Sheet.
- Rough work is to be done in the space provided in the test booklet. An extra plain sheet may be provided by the school for the rough work.
- The OMR Sheet is to be handed over to the invigilator at the end of the exam.
- No candidate is allowed to carry any textual material, printed or written, bits of paper, any electronic device, etc. inside the examination hall.
- The use of unfair means may result in the cancellation of the exam. Any such instances may be reported at **+91-98182-94134** or **info@crestolympiads.com**

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

FILL IN THE DETAILS

Candidate Name: _____

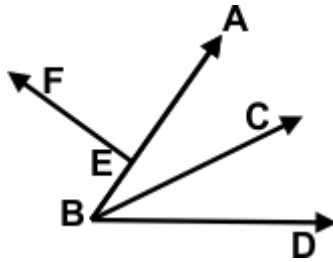Class: _____Section: _____

CREST ID:_____

1. What is the product of $(\sqrt{7} + \sqrt{5})$ and $(\sqrt{7} - \sqrt{5})$?

   a. $\sqrt{5}$
   c. 4

   b. $\sqrt{7} - \sqrt{5}$
   d. 2

2. Solve:
   $\sqrt{5} \times \sqrt{7} \times \sqrt{15} \times \sqrt{21}$

   a. 110
   c. 90

   b. 105
   d. 80

3. What is the product of two consecutive natural numbers?

   a. Even number
   c. Divisible by 3

   b. Prime number
   d. Odd number

4. Find:
   $16 + \frac{8}{4} - 2 \times 3$

   a. 15
   c. 12

   b. 13
   d. 11

5. If $\sqrt{3}$ = 1.732, what is the value of $\frac{2}{\sqrt{3}}$?

   a. 1.441
   c. 4.241

   b. 1.154
   d. 3.532

6. Express $\frac{4}{\sqrt{5}-1}$ with a rational denominator.

   a. $\sqrt{2} + 1$
   c. $\sqrt{7}$

   b. $\sqrt{3} + 2$
   d. $\sqrt{5} + 1$

7. What should be subtracted from $(x + y)^2$ to get $(x^2 + y^2)$?

   a. 2xy
   c. xy

   b. 5xy
   d. 3xy

8. What is the value of the polynomial $-4x^2 + 7x - 5$, when x = -3?

   a. -34
   c. -62

   b. 41
   d. 54

9. What is the degree of the polynomial (y^3 - 2) (y^2 + 11)?

    a. 4   b. 9
    c. 7   d. 5

10. If father is twice as old as his son and 29 years older than his son. What is the age of father?

    a. 47 years   b. 35 years
    c. 58 years   d. 66 years

11. Simplify:
$(x + 7)^2 - (x - 7)^2$

    a. 16x   b. $4x^2$
    c. x – 7   d. 28x

12. Find the roots of the given equation:
$x^2 + 5x + 6 = 0$

    a. -5, 6   b. 3, 7
    c. -3, -2   d. 5, 2

13. A person covers a certain distance at a speed of 60 km/h and returns to the starting point at a speed of 40 km/h. Find the average speed of the person for the whole journey.

    a. 42 km/h   b. 46 km/h
    c. 48 km/h   d. 44 km/h

14. Travelling at $\dfrac{4}{7}$ of his usual speed, a man gets late by 9 min. What time does he take when he travels at his usual speed?

    a. 8 min   b. 12 min
    c. 4 min   d. 10 min

15. A 100 m long train passes a platform which is 200 m long. Find the distance covered by the train in passing the platform.

    a. 350 m   b. 250 m
    c. 218 m   d. 300 m

16. A sum of money doubles itself in 10 years at simple interest. What is the rate of interest?

    a. 10%   b. 15%
    c. 12%   d. 18%

17. Find the simple interest on $1200 for 5 years at 6% per annum.

    a. $380   b. $360
    c. $310   d. $320

18. A person bought an article for $240. For how much should he sell it so as to gain 20%?

   a. $288
   c. $238

   b. $230
   d. $286

19. If you leave a tip of 10% on a bill of $34, what is your total cost?

   a. $34.50
   c. $37.40

   b. $24.56
   d. $45.52

20. 5 years ago, the age of person A was 7 times that of B. At present, the age of A is 4 times that of B. What is the present age of A?

   a. 35
   c. 45

   b. 40
   d. 50

21. The age of a father is 4 times that of his son. Five years ago, the father was 7 times as old as his son at the time. What is the present age of the father?

   a. 30
   c. 45

   b. 35
   d. 40

22. The sum of the ages of a son and father is 60 years. After 2 years, the age of the father will be three times that of the son. What is the age of the son?

   a. 12 years
   c. 16 years

   b. 14 years
   d. 18 years

23. David spends at least 65 minutes a day at the fitness centre. How many minutes does he spend in 5 days?

   a. 225 minutes
   c. 325 minutes

   b. 553 minutes
   d. 258 minutes

24. A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in:

   a. 11 days
   c. 8 days

   b. 12 days
   d. 10 days

25. A man can row upstream at 12 km/h and downstream at 16 km/h. Find the man's speed in still water.

   a. 134km/h
   c. 18 km/h

   b. 16 km/h
   d. 20 km/h

26. The speed of a boat moving upstream is 28 km/h and the speed of a boat moving downstream is 44 km/h. What is the speed of the boat in still water?

a. 38 km/h

b. 32 km/h

c. 36 km/h

d. 28 km/h

27. The average age of three children and their father is 17 years. The average age of these children and their mothers is 13 years. Mother's age is 22 years, what is the father's age?

a. 25

b. 37

c. 38

d. 35

28. If you ate 6 of 8 pieces in an apple pie, what percentage would you have left?

a. 25%

b. 35%

c. 15%

d. 30%

29. The population of a town is 15000. It increases by 10% for the first year, 20% for the second year and 40% for the third year. What will be the population after 3 years?

a. 25680

b. 26430

c. 25460

d. 27720

30. Three partners A, B and C invest $1400, $1600, and $2200 respectively in a business. How should they divide a profit of $2020?

a. $468, $672, $824

b. $648, $472, $924

c. $588, $672, $924

d. $688, $972, $524

31. A and B entered a partnership for a year. A contributed $1500 and B contributed $2000. After 4 months they admitted C, who contributed $2250. If B withdraws his contribution after 9 months, how would they share a profit of $900 at the end of the year?

a. $250

b. $300

c. $450

d. $400

32. What is the equivalent discount if a shopkeeper gives two successive discounts of 50% and 50%?

a. 55%

b. 65%

c. 75%

d. 45%

33. A pair of sunglasses is priced at $50 and is on sale for 30% off. What is the final price of the sunglasses?

a. $32

b. $35

c. $37

d. $38

34. Identify the two pairs of adjacent angles given in the adjoining figure:

    a. ∠ABC and ∠DBC; ∠BEF and ∠AEF   b. ∠CBA and ∠DBC; ∠BEF and ∠AFB

    c. ∠FEC and ∠ABC; ∠BEF and ∠CBA   d. ∠BCF and ∠DBC; ∠BEF and ∠FAD

35. In the figure, find ∠AOC if ∠AOB = 68º and ∠BOC = 42º.

    a. 18º   b. 26º

    c. 39º   d. 44º
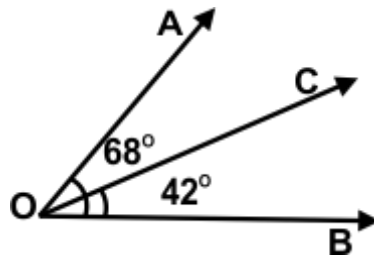
36. The angle between the two blades of scissors is 194º. What type of angle is it?

    a. Straight angle   b. Reflex angle

    c. Obtuse angle   d. Complete angle

37. If CE is the bisector of ∠ACD and CE||BA and ∠ACD = 130^0. Then find ∠BAC.

    a. 55º   b. 65º

    c. 75º   d. 70º
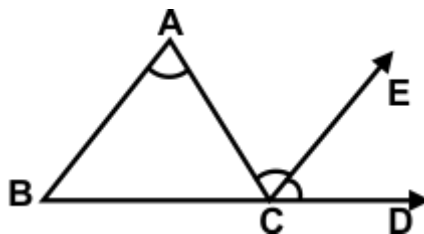
38. In the figure, find x if BC = AD and AB = CD.

    a. 70º   b. 55º

    c. 65º   d. 75º
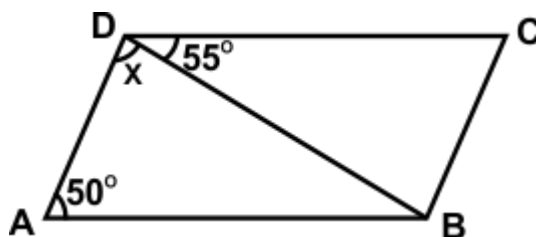
39. In the figure, OB and OC are bisectors of ∠B and ∠C of ΔABC respectively. If ∠BAC = 62°, ∠ABC = 54°, then find ∠BOC.
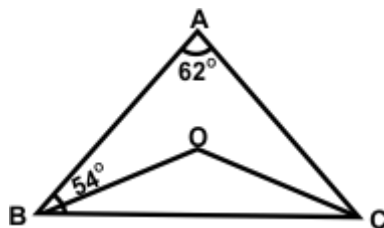
a. 121°
b. 153°
c. 86°
d. 98°

40. In the given figure, PQ || SR and PS = QR. Find 2x + y.
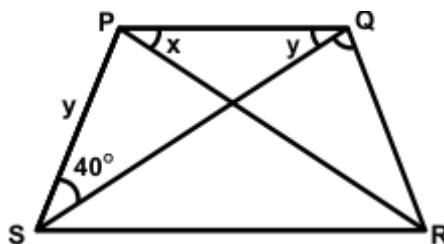
a. 180°
b. 140°
c. 160°
d. 120°

41. In the adjoining figure. Find x.
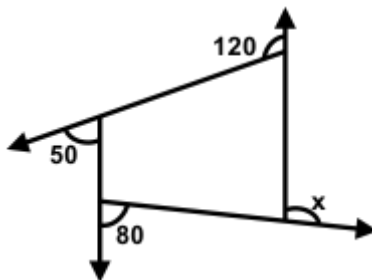
a. 80°
b. 120°
c. 110°
d. 90°

42. ABCD is a cyclic quadrilateral. If A = 95°, then find the measure of ∠C.

a. 65°
b. 115°
c. 90°
d. 85°

43. Fill in the blank:
The greatest chord of a circle is called _____.

a. Radius
b. tangent
c. diameter
d. segment

44. In the given figure, ABCD is a parallelogram. What are the values of x° and y°?
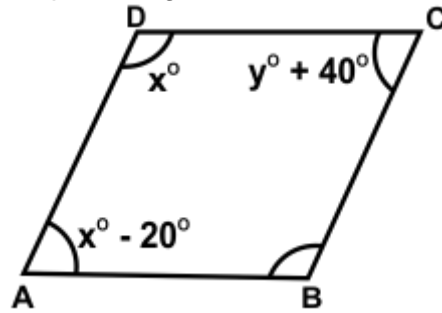
- a. 90°, 50°
- b. 60°, 30°
- c. 80°, 60°
- d. 100°, 40°

45. In the given figure, Find the value of semi perimeter of the triangle.
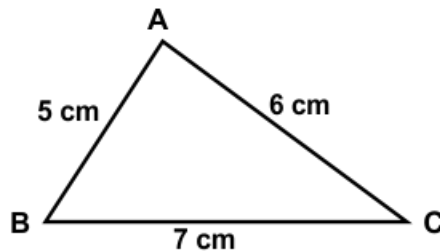
- a. 12 cm
- b. 10 cm
- c. 9 cm
- d. 8 cm

46. Area of an equilateral triangle with side 6 cm is _____.

- a. $4\sqrt{5}$ cm^2
- b. $9\sqrt{3}$ cm^2
- c. $7\sqrt{2}$ cm^2
- d. $1\sqrt{7}$ cm^2

47. Find the radius of a circular field whose circumference measures 11/2 km.

- a. 863 m
- b. 855 m
- c. 875 m
- d. 820 m

48. The circumference of a circle is 176 m. Find the area of a circle.

- a. 2780 m^2
- b. 2350 m^2
- c. 2658 m^2
- d. 2464 m^2

49. The circumference of two circles is 132 m and 176 m respectively. What is the difference between the area of the larger circle and the smaller circle?

- a. 1078 m^2
- b. 1709 m^2
- c. 1830 m^2
- d. 880 m^2

50. The volume of a cube is 27a^3. Find the length of its edge.

- a. 2a
- b. 3a
- c. 6a
- d. 9a

51. How much aluminium sheet will be required to make a container with a lid whose length is 13 m, breadth is 8 m and height is 4 m?

    a. 356 m^2 b. 312 m^2
    c. 376 m^2 d. 385 m^2

52. Find the volume of a cylinder which has a height of 14 m and a base of radius 3 m.

    a. 396 m^3 b. 349 m^3
    c. 318 m^3 d. 356 m^3

53. The diameter of a right circular cone is 14 m, and its slant height is 12 m. Find the curved surface area.

    a. 236 m^2 b. 296 m^2
    c. 264 m^2 d. 288 m^2

54. Find the volume of a sphere whose radius is 6 cm.

    a. 893.46 cm^3 b. 975 cm^3
    c. 686 cm^3 d. 904.32 cm^3

55. 300 m from the foot of a cliff on the level ground, the angle of an elevation of the top of a cliff is 30º. Find the height of this cliff.

    a. 176.5 m   b. 173.2 m
    c. 158.5 m   d. 184.5 m

56. The shadow of a vertical pole is $\sqrt{3}$ of its height. Find the angle of elevation.

    a. 30º   b. 75º
    c. 60º   d. 40º

57. Simplify:

$$\frac{3^2 + 8^0}{5^2}$$

    a. $\dfrac{4}{6}$ b. $\dfrac{3}{7}$
    c. $\dfrac{2}{5}$ d. $\dfrac{9}{25}$

58. What will come in place of question mark (?)?
4, 9, 16, 25, ?

    a. 32   b. 30
    c. 49   d. 36

59. Find the value of question mark (?).
65% of 240 + ? % of 150 = 210

a. 36
b. 35
c. 38
d. 32

60. What will come in place of question mark (?).
3, 6, 11, 18, 27, ?

a. 36
b. 35
c. 38
d. 32

61. How many 7s immediately preceded by 6 but not immediately followed by 4 are there in the following series?
7 4 2 7 6 4 3 6 7 5 3 5 7 8 4 3 7 6 7 2 4 0 6 7 4 3

a. 1
b. 2
c. 3
d. 4

62. Refer to the alphanumeric series given below and answer the question:
How many vowels are there in this series?
C * 4 1 I N & O @ # A 1 &

a. 1
b. 3
c. 4
d. 2

63. If x stands for -, / stands for +, + stands for / and - stands for x, which one of the following equations is correct?

a. (14 x 7) - 3 / (48 + 6) = 29
b. (14 + 7) x 3 + (48 x 6) = 29
c. (14 / 7) x 3 + (48 - 6) = 29
d. (14 + 7) x 3 - (48 / 6) = 29

64. Which number is divisible by 9?
36846, 53363, 36215, 78945

a. 78945
b. 53363
c. 36215
d. 36846

65. Which number is divisible by 14?
3688646, 968754, 485086, 574945

a. 3688646
b. 968754
c. 485086
d. 574945

66. Which number is divisible by 17?
9864476, 6093582, 678508, 896455

a. 9864476
b. 6093582
c. 896455
d. 678508

67. The mean and mode of a data are 24 and 12 respectively. Find the median.

   a. 20   b. 22
   c. 24   d. 26

68. The mean of 10 observations is 15.3. If two observations 6 and 9 are replaced by 8 and 14 respectively. Find the new mean.

   a. 14   b. 16
   c. 18   d. 20

69. Study the graph carefully to answer the question.
What is the ratio between the total production of commodities X and Y for all the seven years together?

   a. 27 : 29   b. 15 : 63
   c. 26 : 32   d. 19 : 34

70. Study the graph carefully to answer the question.
What was the total FDI for the period shown in the figure?

   a. $76.56   b. $93.82
   c. $85.75   d. $69.45

71. Study the line graph carefully to answer the question.

Which month showed the highest absolute difference in the consumer price index over the previous month?

Consumer price index In first seven months of the year 2012

a. Feb

b. May

c. April

d. June

72. The graph below shows the ratio of export to imports of two companies over the years.

In how many of the given years were the exports more than the imports for company A?

a. 2

b. 1

c. 3

d. 4

73. The bar graph below shows the number of students enrolled in three different disciplines in five different colleges.

What is the total number of students studying B.A. in all the colleges together?

a. 1698

b. 1546

c. 1346

d. 1760

74. Find the probability of getting even number between 10 to 25.

    a. $\dfrac{245}{600}$ b. $\dfrac{183}{100}$

    c. $\dfrac{632}{200}$ d. $\dfrac{361}{400}$

75. If the probability of winning a game is 0.7, what is the probability of losing it?

    a. 0.6   b. 0.3
    c. 0.2   d. 0.7

76. In class X total students were 36. Out of which 20 students are boys. Find the probability of girls in the class.

    a. $\dfrac{2}{5}$ b. $\dfrac{6}{3}$

    c. $\dfrac{4}{9}$ d. $\dfrac{3}{8}$

77. Solve:
$(4^2 \times 4^3)^2 \div 2^8$

    a. 4^3 b. 4^4
    c. 4^5 d. 4^6

78. Factorise:
$6x^2 - 5xy - 6y^2$

    a. $(x - 3y)(x - y)$ b. $(x - 3)(x + 3y)$
    c. $(2x - 3y)(3x + 2y)$ d. $(2x - 3)(3x - 3y)$

79. Study the table graph and answer the question:
The Gross turnover for 2018 - 19 is about what percent of the gross turnover for 2020 - 21?

		Financial Statement of a Company Over the Years(million)			
Year	Gross Turnover $	Profit before interest and depreciation	Interest $	Depreciation $	Net Profit $
2016-17	1380.00	380.92	300.25	69.90	10.67
2017-18	1401.00	404.98	315.40	71.12	18.46
2018-19	1540.00	520.03	390.85	80.02	49.16
2019-20	2112.00	599.01	444.44	88.88	65.69
2020-21	2520.00	811.00	505.42	91.91	212.78
2021-22	2758.99	920.00	600.20	99.00	220.80

    a. 163%   b. 61%
    c. 0.61%   d. 39%

80. Study the table and answer the question:

During which year did the 'Net Profit' exceed $100 million for the first time?

Financial Statement of a Company Over the Years(million)					
Year	Gross Turnover $	Profit before interest and depreciation	Interest $	Depreciation $	Net Profit $
2016-17	1380.00	380.92	300.25	69.90	10.67
2017-18	1401.00	404.98	315.40	71.12	18.46
2018-19	1540.00	520.03	390.85	80.02	49.16
2019-20	2112.00	599.01	444.44	88.88	65.69
2020-21	2520.00	811.00	505.42	91.91	212.78
2021-22	2758.99	920.00	600.20	99.00	220.80

a. 2021 – 22
b. 2020 - 21
c. 2019 – 20
d. 2018 - 19

Avance (Each Question is 6 Marks)

81. If H.C.F. of two number 68 and 85 is 17. What is the L.C.M. of these two numbers?

a. 340
b. 260
c. 400
d. 410

82. If P = 3 - $2\sqrt{2}$, what is the value of $P^2 + \frac{1}{P^2}$?

a. 28
b. 30
c. 34
d. 22

83. Find the value of k if x + 3 is a factor of $3x^2 + kx + 6$.

a. 11
b. 15
c. 14
d. 8

84. The simple interest on a certain sum of money for 2 years at 10% per annum is $200, find compound interest at the same rate and for the same time.

a. $160
b. $260
c. $170
d. $210

85. By selling an article for $570, a tradesman would lose 5%. At what price must he sell it to gain 10%?

a. $670
b. $640
c. $660
d. $620

86. A boat travels a distance of 25 km upstream in 5 h. If the speed of the boat in still water is 6 km/h, then find the speed of stream.

    a. 2 km/h   b. 1 km/h
   c. 4 km/h   d. 6 km/h

87. A began a business with $400 and was joined afterwards by B with $300. When did B join if the profits at the end of the year were divided in the ratio 2 : 1?

    a. 8   b. 7
    c. 9   d. 6

88. Jack bought an article with 20% discount on the labelled price. He sold the article with 30% profit on the labelled price. What was his per cent profit on the price he bought?
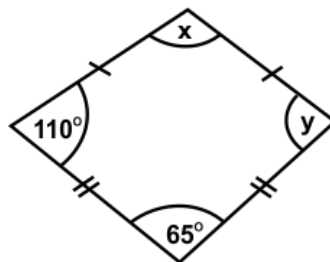
    a. 52.50%   b. 66.50%
    c. 56.50%   d. 62.50%

89. In the given figure, LM and PQ are parallel to each other and AB is the transversal. If ∠MCD = $(3x)°$ and ∠QDC = $(2x + 50)°$, then what is the value of x?
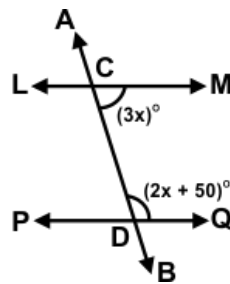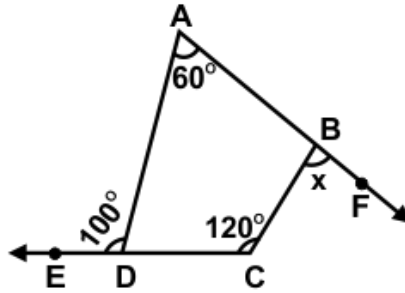

    a. 36   b. 46
    c. 26   d. 40

90. In the given figure, find x and y.

    a. x = 65°, y = 110°   b. x = 75°, y = 110°
    c. x = 75°, y = 135°   d. x = 45°, y = 90°

91. In the given figure, sides AB and CD of the quadrilateral ABCD are produced. Find the value of x.

a. 80º

b. 120º

c. 60º

d. 90º

92. Find the area of a triangle whose sides are 50 m, 78 m, 112 m respectively.

a. 1680 m²

b. 2175 m²

c. 1587 m²

d. 2380 m²

93. Find the weight of a lead pipe 3.5 cm long if the external diameter is 2.4 cm, the thickness of the lead is 2 mm and 1 cm³ of lead weighs 11.4 g.

a. 127.32 g

b. 115.36 g

c. 167.34 g

d. 135.2 g

94. Angles of elevation of top and bottom of a flag kept on a flag post at 30 m distance are 45º and 30º respectively. What is the height of the flag?

a. 11.42 m

b. 8.34 m

c. 14.32 m

d. 12.68 m

95. Which number is divisible by 19?
857676, 19721246, 875879, 4565759

a. 4565759

b. 857676

c. 875879

d. 19721246

96. What is the mean of first 12 prime numbers?

a. 14.83

b. 15.63

c. 16.41

d. 17.20

97. Evaluate:
$(125 \div 625) + 110$

a. 90

b. 94.3

c. 103.6

d. 110.2

98. Study the graph and answer the question.
The production of state D in 2019 - 20 is how many times its production in 2018 - 19?

Production of Cotton bales of 100 kg.
each in ten thousands in States A,B,C,D,
and E during 2017-18, 2018-19, 2019-20

a. 0.45
b. 0.75
c. 0.55
d. 0.35

99. Study the table carefully and answer the question:
In which of the following banks did the disbursement of loans continuously increase over the years?

Loan disbursed by Five banks					
(Value in 10 million)					
Years					
Banks	2018	2019	2020	2021	2022
A	18	23	45	30	70
B	27	33	18	41	37
C	29	29	22	17	11
D	31	16	28	32	43
E	13	19	27	34	42
Total	118	120	140	154	203

a. A
b. B
c. D
d. E

100. Factorise:
$x(a - 1) + y(1 - a)$

a. $(a - 1)(x - y)$
b. $(2a - 1)(x - y)$
c. $(a - 1)(2x + y)$
d. $(a - 1)(2x + 3y)$

Answer Key

1.	d	2.	b	3.	a	4.	c	5.	b	6.	d	7.	a
8.	c	9.	d	10.	c	11.	d	12.	c	13.	c	14.	b
15.	d	16.	a	17.	b	18.	a	19.	c	20.	b	21.	d
22.	b	23.	c	24.	d	25.	a	26.	c	27.	c	28.	a
29.	d	30.	c	31.	b	32.	c	33.	b	34.	a	35.	b
36.	b	37.	b	38.	d	39.	a	40.	a	41.	c	42.	d
43.	c	44.	d	45.	c	46.	b	47.	c	48.	d	49.	a
50.	b	51.	c	52.	a	53.	c	54.	d	55.	b	56.	a
57.	c	58.	d	59.	a	60.	c	61.	b	62.	b	63.	a
64.	d	65.	c	66.	b	67.	a	68.	b	69.	a	70.	b
71.	c	72.	c	73.	d	74.	d	75.	b	76.	c	77.	d
78.	c	79.	b	80.	b	81.	a	82.	c	83.	a	84.	d
85.	c	86.	b	87.	a	88.	a	89.	c	90.	b	91.	a
92.	a	93.	b	94.	d	95.	d	96.	c	97.	d	98.	b
99.	d	100.	a										